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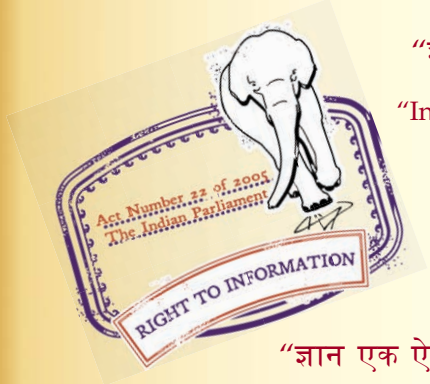
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IS : 4366 (Part 1) - 1985
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Indian Standard

SPECIFICATION FOR AGRICULTURAL TILLAGE DISCS

PART 1 CONCAVE TYPE

(Second Revision)

UDC 631·312·021·6 : 631·51·021

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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August 1985

Indian Standard

SPECIFICATION FOR AGRICULTURAL TILLAGE DISCS

PART 1 CONCAVE TYPE

(Second Revision)

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SPECIFICATION FOR AGRICULTURAL TILLAGE DISCS

PART 1 CONCAVE TYPE

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Part 1) (Second Revision) was adopted by the Indian Standards Institution on 28 January 1985, after the draft finalized by the Soil Working Equipment Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 This standard was first published in 1967 and subsequently revised in 1972. This second revision incorporates certain improvements in the agricultural tillage discs found necessary in the light of the modifications suggested by testing authorities and the manufacturers. Advantage has also been taken to update the standard regarding terminology, material and method of testing, and incorporating an amendment to its 1972 version.

0.2.1 The concerned Committee also decided to incorporate the deflection and impact values for the nominal sizes 510 mm, 560 mm and 610 mm in this revision. The impact and deflection values for other sizes would be incorporated later.

0.3 For the guidance of purchaser, specification sheet is given in Appendix A. This should be filled in accordance with the agreement between the manufacturer and the purchaser.

0.4 Though efforts have been made to keep this standard in line with ISO 5679-1979 'Specification for equipment for working the soil — Disks — Classification main fixing dimensions', this standard deviates from the International Standard for the following requirements:

a) Radius of concavity,

b) Cutting edge bevelling, and

c) Sizes.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 1) specifies the materials, dimensions and other requirements for agricultural tillage discs, concave type.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Concavity — The depth measured at the lowest point at the centre of the disc by placing its concave side on a flat surface.

2.2 Disc — A circular, concave and revolving steel plate used for cutting and inverting the soil.

2.3 Eccentricity — The radial deviation of points on the disc edge in a plane perpendicular to the axis of the disc when the disc is rotated about its centre.

2.4 Wobble — The axial deviation of points on the disc edge in a plane parallel to the axis of the disc when the disc is rotated about its centre.

2.5 Nominal Size — The overall diameter of the disc.

NOTE — For other terminologies *see* IS : 9818 (Part 2)-1981†.

3. TYPES

3.1 Concave discs shall be of following types:

a) Plain (*see* Fig. 1),

b) Notched (*see* Fig. 2), and

c) Flat centred (*see* Fig. 3).

4. MATERIAL

4.1 The steel used for the manufacture of disc shall conform to IS : 9442-1980‡.

*Rules for rounding off numerical values (*revised*).

†Glossary of terms relating to tillage and inter cultivation equipment: Part 2 Terms relating to equipment.

‡Specification for hot rolled steel plates, sheets and strips for manufacture of agricultural tillage discs.

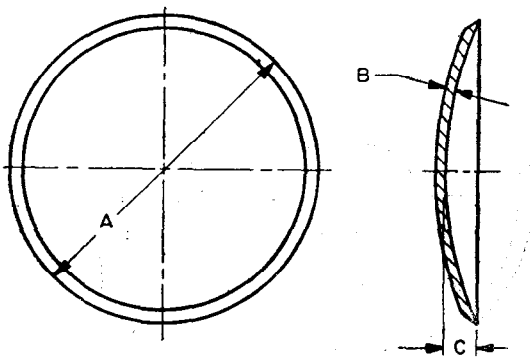


FIG. 1 CONCAVE PLAIN DISC

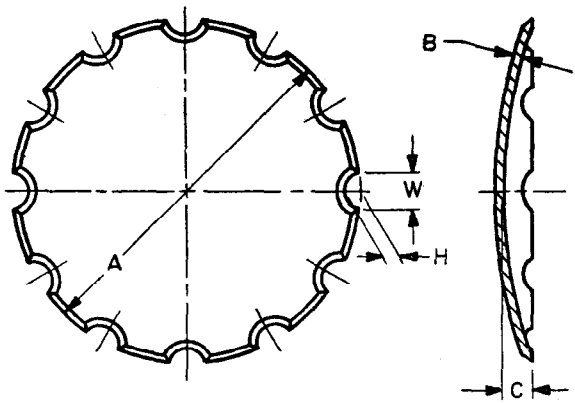


FIG. 2 CONCAVE NOTCHED DISC

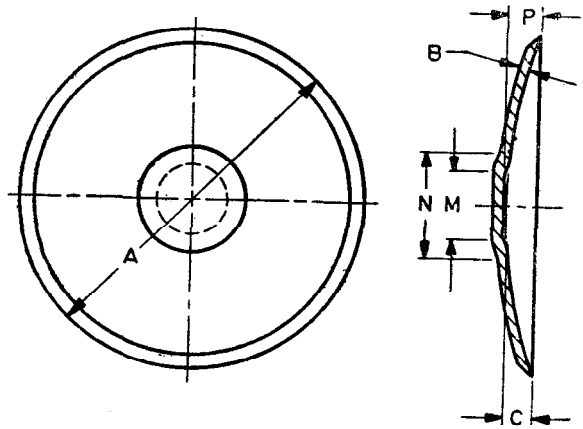


FIG. 3 CONCAVE FLAT CENTRED DISC

4.2 The manufacturer shall declare the grade of steel.

5. HARDNESS

5.1 The disc shall be either fully or partially hardened.

5.2 The fully hardened discs shall be properly and uniformly heat-treated to have a hardness of 38 to 45 HRC; the equivalent Brinell and Vickers hardness numbers are 353 to 421 HB and 373 to 446 HV respectively. Hardness shall be tested in accordance with **8** of IS : 9217-1979*.

5.3 The partially hardened discs shall be properly heat treated so as to give a circular hardened area extending inwards from the outside cutting edge. The hardened area shall cover one-third of the radius of disc, subject to a minimum of 70 mm.

5.3.1 The hardness in hardened zone shall be the same as in **5.2.**

5.4 The hardness values in the area defined in **5.2** and **5.3** shall not differ from the maximum hardness found on the same disc by more than 10 percent.

6. DIMENSIONS AND TOLERANCES

6.1 The essential dimensions for all types of concave discs shall be as given in Table 1.

6.2 Other dimensions for notched concave discs shall be as given in Table 2.

*Test code for agricultural discs.

TABLE 1 ESSENTIAL DIMENSIONS OF CONCAVE DISCS

(*Clause* 6.1 and *Fig.* 1)

All dimensions in millimetres.

Sl No.	Nominal Size *A*	Thickness, *Min* *B*	Concavity *C*
(1)	(2)	(3)	(4)
i)	250	2·50	12·5
ii)	280	2·50	16·5
iii)	315	3·15	20
iv)	355	3·15	27·5
v)	405	3·15	35
vi)	455	3·55	45
vii)	510	3·55	55
viii)	560	4·0	70
ix)	610	4·0	82·5
x)	660	5·0	100
xi)	710	6·0	115
xii)	760	8·0	135
xiii)	810	8·0	155

TABLE 2 OTHER DIMENSIONS FOR NOTCHED CONCAVE DISCS

(*Clause* 6.2 and *Fig.* 2)

All dimensions in millimetres.

Sl No.	Disc Size *A*	Equally Spaced Notch Numbers	Notch Width *W*	Notch Depth *H*
(1)	(2)	(3)	(4)	(5)
i)	250	5	70	26
ii)	280	5	70	26
iii)	315	6	70	26
iv)	355	7	70	26
v)	405	8	70	26
vi)	455	9	82	32
vii)	510	10	82	32
viii)	560	11	82	32
ix)	610	12	82	32
x)	660	13	95	45
xi)	710	14	95	45
xii)	760	15	95	45
xiii)	810	16	95	45

Note — Notch width *W* and notch depth *H* are recommendatory.

6.3 Other dimensions for flat centred concave discs shall be as given in Table 3.

TABLE 3 OTHER DIMENSIONS FOR FLAT CENTRED TYPE DISCS

(*Clause* 6.3 and *Fig.* 3)

All dimensions in millimetres.

Sl No.	Disc Size			
	A	*M*	*N*	*P*
(1)	(2)	(3)	(4)	(5)
i)	250	50	100	22·5
ii)	280	55	105	26·5
iii)	315	65	115	30
iv)	355	70	120	37·5
v)	405	80	130	50
vi)	455	90	140	60
vii)	510	100	150	70
viii)	560	110	160	85
ix)	610	120	170	102·5
x)	660	130	180	120
xi)	710	140	190	135
xii)	760	150	200	155
xiii)	810	160	210	180

6.4 The tolerances for different dimensions of the discs shall be as given in Table 4.

6.5 The dimensions shall be checked in accordance with **6** of IS : 9217-1979*.

7. HOLE TYPES

7.1 The holes in concave discs shall be of the following types:

a) Centre square hole (*see* Fig. 4);

b) Centre circular hole with keyway (*see* Fig. 5); and

c) Several fixing holes with or without central circular hole (*see* Fig. 6),

1) Fixing holes for countersunk bolt, and

2) Fixing holes for rivets.

*Test code for agricultural discs.

TABLE 4 TOLERANCES

(*Clause* 6.4)

Sl No.	Dimension	Tolerance mm
(1)	(2)	(3)
i)	Nominal size, *A* (mm)	
	Up to 405	+ 2 − 3
	455 and 510	+ 3 − 4
	560	+ 4 − 5
	610 and 660	+ 4 − 5
	710	+ 5 − 6
	760	+ 5 − 8
	810	+ 10 − 12
ii)	Thickness *B*	Shall conform to tolerance specified in **10.2** of IS : 9442-1980*. However the actual thickness shall not fall below the minimum value specified in Table 1
iii)	Concavity, *C* for nominal size (mm)	
	Up to 455	± 2·5
	510 and 560	± 3·5
	610	± 5·0
	660	± 6·5
	710	± 8·0
	760	± 10·0
	810	± 12·5
iv)	Central hole (round or square)	+ 1·5 − 0·0
v)	Keyway	+ 1·0 − 0·0
vi)	Fixing hole:	
	a) Square 12·5 mm	+ 1·0 − 0·0
	b) Round 10·5 mm	+ 0·50 − 0·00

*Specification for hot-rolled steel plates, sheets and strips for manufacture of agricultural tillage discs.

(*Continued*)

TABLE 4 TOLERANCES — *Contd*

Sl No.	Dimension	Tolerance mm
(1)	(2)	(3)
vii)	Pitch circle diameter (PCD)	± 1·0
viii)	Fixing hole position	
	The centre of each hole should be within the radius of nominal position for the nominal size of disc:	
	Below 610 mm	± 0·5
	610 mm and above	± 1·0
ix)	Bevel edge:	
	a) Bevel angle	± 2° of declared angle
	b) Bevel length	± 2 mm of declared angle

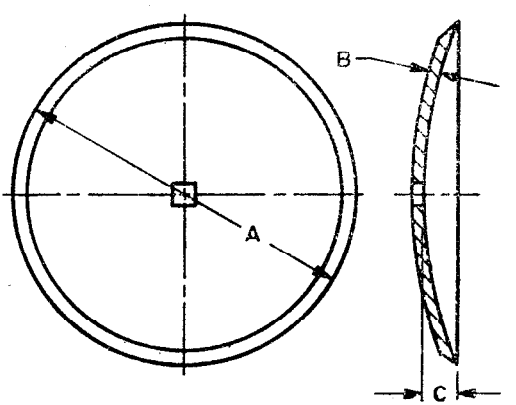


FIG. 4 DISC WITH SQUARE HOLE

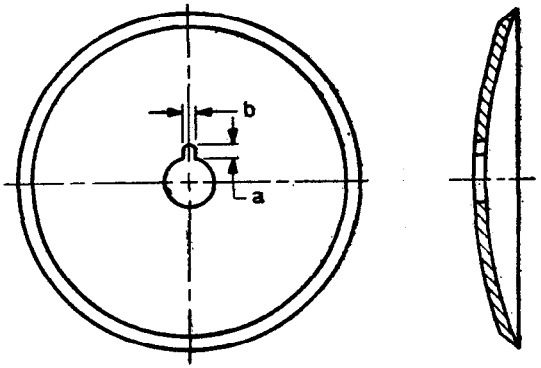


FIG. 5 DISC WITH CIRCULAR HOLE WITH KEYWAY

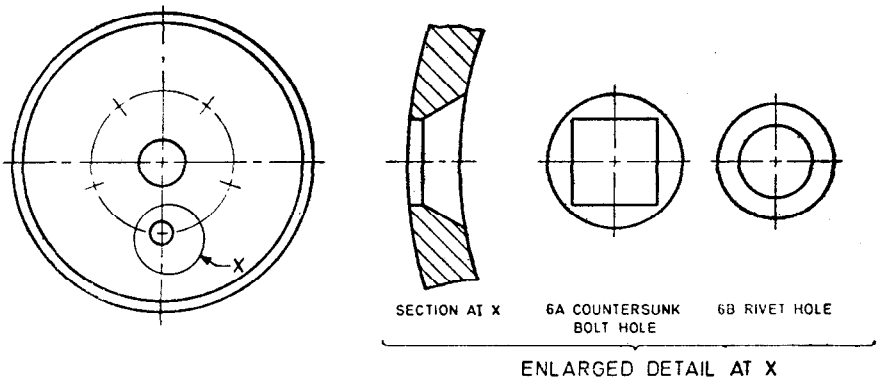


FIG. 6 DISC WITH SEVERAL FIXING HOLES WITH OR WITHOUT CENTRE HOLE

8. HOLE SIZES

8.1 Centre Square Hole — The sizes of central square holes shall be 23, 26, 29, 31 and 33 mm. Up to 405 mm size discs, the hole size shall be not more than 26 mm.

8.2 Circular Centre Hole with Keyway

8.2.1 The diameter of circular hole shall be 65 mm.

8.2.2 The keyway size (*see* $a \times b$ in Fig. 5) shall be 15·0 × 15·0 or 16·0 × 18·0 mm.

8.3 Several Fixing Holes With or Without Circular Centre Hole

8.3.1 *Central Hole* — The diameter of the central hole, if provided, shall be 28·5, 31, 51, 65 and 72 mm.

8.3.2 *Pitch Circle Diameter (PCD)* — The pitch circle diameter of the discs shall be 100, 210, 230, 290, and 350 mm.

8.3.3 *Number of Holes* — The number of fixing holes shall be four holes for sizes up to 560 mm and five holes for sizes above 560 mm.

8.3.4 *Size of Fixing Holes*

8.3.4.1 The square size of fixing holes for 12 mm countersunk bolt shall be 12·5 mm. As far as possible, the countersunk bolt of M12 size conforming to IS : 2609-1972* shall be used.

8.3.4.2 The circular size of fixing holes for 10 mm rivet shall be 10·5 mm. As far as possible, the rivet dimensions shall conform to the requirements as stipulated in IS : 2155-1982†.

8.4 Unless otherwise agreed to between the purchaser and the supplier, the hole type and size for different sizes of discs shall preferably be as given in Table 5.

8.5 The dimensions of fixing holes and pitch circle diameter shall be measured as per the method given in **6** of IS : 9217-1979‡.

9. OTHER REQUIREMENTS

9.1 The eccentricity and wobble shall not exceed the values given in Table 6 and they shall be measured in accordance with **7.2** and **7.3** of IS : 9217-1979‡.

9.2 When tested in accordance with **11** of IS : 9217-1979‡ the permanent deflection shall not exceed 5 mm for the nominal sizes 510 mm, 560 mm and 610 mm.

9.3 When tested in accordance with **12** of IS : 9217-1979‡ the disc shall meet the requirements given there of and also at the height of free fall of 1 500 mm the deflection shall not exceed 8 mm for the nominal sizes 510 mm, 560 mm and 610 mm.

9.4 The thickness of the cutting edge shall be reasonably uniform. The edge thickness for the discs below 560 mm nominal size shall be between 0·2 to 1·0 mm and for discs of nominal size 560 mm and above shall be between 0·5 to 1·5 mm.

---

*Specification for coach bolts (*first revision*).

†Specification for cold forged solid steel rivets for hot closing (6 to 16 mm diameter) (*first revision*).

‡Test code for agricultural discs.

TABLE 5 HOLE TYPE AND SIZE FOR DIFFERENT SIZES OF DISCS

(*Clause* 8.4)

All dimensions in millimetres.

Sl No.	Disc Size	Centre Square Hole Size	Centre Circular Hole Size	Several Fixing Holes							
				With Bolt Fixing				With Rivet Fixing			
				Centre hole dia (if required)	Pitch circle dia	Fixing hole size	No. of holes	Centre hole dia (if required)	Pitch circle dia	Fixing hole size	No. of holes
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	250	23	—	—	—	—	—	—	—	—	—
ii)	280	23	—	—	—	—	—	—	—	—	—
iii)	315	23, 26	—	—	—	—	—	51	100	10·5	4
iv)	355	26	—	—	—	—	—	65	100	10·5	4
v)	405	26	—	—	—	—	—	72	100	10·5	4
vi)	455	26, 29	65	—	—	—	—	—	—	—	—
vii)	510	26, 29, 31	65	—	—	—	—	—	—	—	—
viii)	560	29, 31	65	—	—	—	—	—	—	—	—
ix)	610	29, 31	65	28·5, 31	210, 230	12·5	5	—	—	—	—
x)	660	31, 33	65	28·5, 31	210, 230	12·5	5	—	—	—	—
xi)	710	—	—	28·5, 31	230, 290	12·5	5	—	—	—	—
xii)	760	—	—	28·5, 31	290, 350	12·5	5	—	—	—	—
xiii)	810	—	—	—	350	12·5	5	—	—	—	—

TABLE 6 ECCENTRICITY AND WOBBLE IN CONCAVE DISCS

(*Clause* 9.1)

All dimensions in millimetres.

Sl No.	Nominal Size	Eccentricity, *Max*	Wobble, *Max*
(1)	(2)	(3)	(4)
i)	Up to 355	1·5	3·0
ii)	405	2·5	4·5
iii)	455 to 560	3·0	6·0
iv)	610 and 660	4·0	6·0
v)	710	8·0	9·5
vi)	760 and 810	8·0	12·5

9.5 The cutting edge of the disc shall be bevelled on one side or both sides as specified by the purchaser. The bevelling may have single or double (stepped) angle on one or both sides as specified by the purchaser.

NOTE — For the guidance of the purchaser and the manufacturer, some of the common values of bevel angle and length are given below:

a) *Bevel Angle*

i) For single angle — 30° or 40°

ii) For stepped angle — 50°/25°, 60°/30°, 65°/32°, 65°/45°

b) *Bevel Length* — 22 mm, *Max*

9.6 The radius of concavity shall be a true radius.

9.7 Square holes shall be square and smooth. The corners of the square holes shall be rounded.

9.8 The crown of the keyway shall be rounded.

9.9 The fixing holes shall be equally spaced on pitch circle diameter.

10. DESIGNATION

10.1 A disc shall be designated by its type, nominal size and thickness.

Example:

Concave disc, plain edge, 560 mm nominal size, and 4·0 mm thickness, shall be designated as:

Plain Concave Disc 560/4·0/IS : 4366 (Part 1)

11. WORKMANSHIP AND FINISH

11.1 Both the surfaces of the discs shall be free from cracks and shall be reasonably free from flaws, such as seams, scales, pits, burrs and nicks.

11.2 The discs shall be free from rust and shall have a protective coating which will prevent surface deterioration in transit and storage.

12. MARKING AND PACKING

12.1 Marking — Each disc shall be legibly punched or stamped on the non-wearing portion of the disc with the following particulars:

a) Manufacturer's name or recognized trade-mark, if any; and

b) Batch or code number.

12.1.1 Each disc may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

12.2 Packing — Discs of the same type, size, thickness and concavity shall be packed in bundles of 5 or as specified by the purchaser for convenience and safe handling in transit.

13. SAMPLING AND ACCEPTANCE

13.1 Unless otherwise agreed to between the purchaser and the supplier, the sampling of the agricultural tillage discs for lot acceptance shall be done in accordance with **3** of IS : 7201-1974*.

*Methods of sampling of agricultural machinery and tractors.

APPENDIX A

(*Clause* 0.3)

SPECIFICATION SHEET

1. Name of the purchaser

2. Address

3. Type of disc required (*see* **3.1**):

a) Plain

b) Notched

i) Notch width (W)

ii) Notch depth (H)

c) Flat centred:

i) Diameter of flat portion only (M)

ii) Diameter of flat portion including slopes (N)

iii) Lowest depth at centre including concavity (P)

4. Fully or partially hardened (*see* **5**)

5. Hole type (*see* **7.1**)

6. Hole size (*see* **8**)

7. Bevel edge (*see* **9.5**):

a) One side or both sides

b) Single or stepped

c) Bevel angle

d) Bevel length

8. Designation of disc (*see* **10.1**)

9. Any other requirement

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